

**What is claimed is:**

1. A radio communication system for performing radio communication by combining the OFDM modulation method and the CDMA modulation method, the system comprising:

5       a transmitter apparatus configured to estimate conditions of propagation paths used in the radio communication, arrange information symbols along the direction of the frequency axis in accordance with a predetermined pattern based on the estimated conditions of propagation paths, and transmit  
10 a radio communication signal including the arranged information symbols; and

      a receiver apparatus configured to receive the radio communication signal, and rearrange the information symbol included in the radio communication signal along the direction  
15 of the frequency axis in accordance with a reverse pattern to the predetermined pattern.

2. A radio communication method for performing radio communication by combining the OFDM modulation method and the  
20 CDMA modulation method, the method comprising the steps of:

      estimating conditions of propagation paths used in the radio communication, arranging information symbols along the direction of the frequency axis in accordance with a predetermined pattern based on the estimated conditions of  
25 propagation paths, and transmitting a radio communication signal including the arranged information symbols, in a transmitter apparatus; and

      receiving the radio communication signal, and rearranging the information symbol included in the radio

communication signal along the direction of the frequency axis in accordance with a reverse pattern to the predetermined pattern, in a receiver apparatus.

5           3. A transmitter apparatus used in a radio communication system for performing radio communication by combining the OFDM modulation method and the CDMA modulation method, wherein

the transmitter apparatus estimates conditions of propagation paths used in the radio communication, arranges  
10 information symbols along the direction of the frequency axis in accordance with a predetermined pattern based on the estimated conditions of propagation paths, and transmits a radio communication signal including the arranged information symbols.

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4. The transmitter apparatus according to claim 3, the apparatus comprising:

a plurality of symbol arrangers configured to arrange the information symbols along the direction of the frequency axis  
20 in accordance with the predetermined pattern;

a propagation path condition estimator configured to estimate the conditions of propagation paths;

a symbol arrangement scheme selector configured to select the symbol arranger for arranging the information symbols from  
25 among the plurality of symbol arrangers, based on the estimated conditions of propagation paths; and

a signal transmitter configured to transmit the radio communication signal including the arranged information symbols.

5. The transmitter apparatus according to claim 4,  
wherein

the plurality of symbol arrangers comprises:

5       a first symbol arrangers configured to arrange the  
information symbols after error correction encoding along the  
direction of the frequency axis in accordance with the  
predetermined pattern;

10       a second symbol arrangers configured to arrange the  
information symbols after data modulation along the direction  
of the frequency axis in accordance with the predetermined  
pattern; and

15       a third symbol arrangers configured to arrange the chips  
which spread the information symbols along the direction of the  
frequency axis in accordance with the predetermined pattern.

6. The transmitter apparatus according to claim 3, the  
apparatus comprising:

20       a pattern selector configured to select the predetermined  
pattern based on the estimated conditions of propagation paths;

      a symbol arranger configured to arrange the information  
symbols along the direction of the frequency axis in accordance  
with the selected predetermined pattern; and

25       a signal transmitter configured to transmit the radio  
communication signal including the arranged information  
symbols.

7. The transmitter apparatus according to claim 6,  
wherein the symbol arranger arranges the information symbols

after error correction encoding along the direction of the frequency axis in accordance with the predetermined pattern.

8. The transmitter apparatus according to claim 6,  
5 wherein the symbol arranger arranges the information symbols after data modulation along the direction of the frequency axis in accordance with the predetermined pattern.

9. The transmitter apparatus according to claim 6,  
10 wherein the symbol arranger arranges chips which spread the information symbols along the direction of the frequency axis in accordance with the predetermined pattern.

10. The transmitter apparatus according to claim 3,  
15 wherein the symbol arrangement is performed along both the direction of the frequency axis and the direction of the time axis.

11. A receiver apparatus used in a radio communication  
20 system for performing radio communication by combining the OFDM modulation method and the CDMA modulation method, wherein

the receiver apparatus configured to receive a radio communication signal from a transmitter, and rearrange information symbol included in the radio communication signal  
25 along the direction of the frequency axis in accordance with a reverse pattern to a predetermined pattern; and

a transmitter apparatus estimates conditions of propagation paths used in the radio communication, arranges the information symbols along the direction of the frequency axis

in accordance with the predetermined pattern based on the estimated conditions of propagation paths, and transmits the radio communication signal including the arranged information symbols.

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12. The receiver apparatus according to claim 11, the apparatus comprising:

a signal receiver configured to receive the radio communication signal; and

10 a plurality of symbol rearranger configured to rearrange the information symbol included in the radio communication signal along the direction of the frequency axis in accordance with the reverse pattern to the predetermined pattern; and wherein

15 the symbol rearranger which is selected from among the plurality of the symbol rearranger rearranges the information symbols.

13. The receiver apparatus according to claim 12, wherein

20 the plurality of symbol rearranger comprises:

a first symbol rearranger configured to rearrange the information symbol after data demodulation along the direction of the frequency axis in accordance with the reverse pattern to the predetermined pattern;

25 a second symbol rearranger configured to rearrange the information symbol after reverse spreading along the direction of the frequency axis in accordance with the reverse pattern to the predetermined pattern; and

a third symbol rearranger configured to rearrange chips

after the time-frequency conversion along the direction of the frequency axis in accordance with the reverse pattern to the predetermined pattern, the chips spreading the information symbols.

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14. The receiver apparatus according to claim 11, the apparatus comprising:

a signal receiver configured to receive the radio communication signal; and

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a symbol rearranger configured to rearrange the information symbol included in the radio communication signal along the direction of the frequency axis in accordance with the reverse pattern to the predetermined pattern.

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15. The receiver apparatus according to claim 14, wherein the symbol rearranger rearranges the information symbol after data demodulation along the direction of the frequency axis in accordance with the reverse pattern to the predetermined pattern.

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16. The receiver apparatus according to claim 14, wherein the symbol rearranger rearranges the information symbol after reverse spreading along the direction of the frequency axis in accordance with the reverse pattern to the predetermined pattern.

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17. The receiver apparatus according to claim 14, wherein the symbol rearranger rearranges chips after the time-frequency conversion along the direction of the frequency axis in

accordance with the reverse pattern to the predetermined pattern, the chips spreading the information symbols.

18. The receiver apparatus according to claim 11, wherein  
5 the symbol rearrangement is performed along both the direction of the frequency axis and the direction of the time axis.